



Bathgate N.B.
5 Dec. 1871

My Dear DeRance.

Many thanks for your letter & its enclosure. The Succession of Swedish Drift is what I had already gathered from various sources - but it is exceedingly nice to have it confirmed. You do not say where the extract is taken from. Will you some time kindly let me know. One gets buried in the country & lost to libraries. I have for some time been gathering up all I can from foreign sources as to Succession of Drift and I find a wonderful agreement. The Scotch Succession is the same in Switzerland, Scandinavia, Denmark, Germany, Russia & North America! In another paper in the mag. I will give a brief digest of the results. I cannot help thinking that your upper & lower B Clay ~~series~~ with the middle sand series all belong together to

Scottish	Swedish	N. America	? English
1 2 1/2 ft. of water calc. -	1 Clay with stones	1 Unmodified drift with water, pebbles & sand, 2 1/2 ft. clay & 2 Mercuries	2 1/2 ft. Boulder clay & water calc. with
2 Mercuries	2 ? (not as confirmed)	2 Mercuries	2 ?
3 ?	3 Mer	3 ? or a frame	3 Sand & gravel & mud. & sand & gravel
4 1/2 ft. clay: Snails & 4 Shells clay: Snails & 4 Shells clay	4 Shells clay: Snails & 4 Shells clay	4 Shells clay: Snails & 4 Shells clay	4 Snails & 4 Shells clay
5 Mercuries	5 Mercuries	5 Mercuries	5 Mer

This is a rather incoherent note - but I write in haste. I am much obliged certainly for your letter. The occ. occurs the gravel mound for mention seems confirming & my notion that your fanciful B. Clay & Middle Sands may agree all be older than the frame & therefore the equivalents of No 1

Yours sincerely Jas. DeRance

the period of the Till - that is to say that they represent the Scottish Till & interglacial deposits. I think it is almost certain that they are all of older date than the Kames series of Scotland & older of Scandinavia. I would say the same of Scotch Woods Drift on the other side of England - they are all of older date than the Kames & therefore must be the equivalents of the Scottish Till & interglacial beds. It is a utopian notion to attempt to correlate ~~these beds~~ each bed separately with some other bed in some other District of the country. Your Lancashire beds need not be the exact equivalents, bed for bed, of Scotch Woods' Drift, and yet at the same time may be the equivalents of the Scottish Till. Marine B. Clays might be depositing in one place while land till was gathering in another. I cannot believe that any English B. Clay whatever represent the craters & later moraine drift which are scattered over the tops of the Scottish Kames. After the Kame period the Scottish glaciers were never more than small insignificant affairs quite innocent of the manufacture

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of B. Clay - they scattered some angular debris & big craters - that is all. Is it possible that the English local glaciers were any greater? Our succession begins with the oldest as follows:-

- 1 Till with subjacent & intercalated beds of sand, silt, clay & gravel.
- 2 Moraines (much denuded)
- 3 Kames-series
- 4 Brick clays & craters
- 5 Later Moraines

No. 2 represent the rubbish (terminal moraines) left behind on the withdrawal of the ice sheet. I believe them to be terminal: which implies that the land did not subside until the ice had withdrawn from the low grounds. No. 3 is made up out of No. 2 and No. 1. and was deposited during subsidence = mild period. No. 4 indicates return of cold conditions & was deposited during the rise of the land. The craters always rest upon & never occur in the Kames - but are frequent in the shelly brick-clays. The later moraines No. 5 indicate final retreat of the glaciers. I should mention that the brick clays graduate up into deposits with shells same as in adjoining seas.

GEIKIE (**James**, F.R.S., *prof. geol., Edin., brother of the above*, 1839-1915) A.L.S. (**JAS. GEIKIE**), Bathgate N.B., 5 Dec. 1871, to 'My dear De Rance', 4 closely written pages 8vo., £1, 10s

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LONDON SOTHERAN

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